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IS 7858 (1991): Surgical microscope [MHD 12: Hospital Equipment]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

शल्यक सूक्ष्मदर्शी यन्त्र — विशिष्ट
(पहला पुनरीक्षण)

Indian Standard

SURGICAL MICROSCOPE — SPECIFICATION
(First Revision)

UDC 681.723 : 615.478.6

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Medical Instruments and Disposables Sectional Committee had been approved by the Medical Equipment and Hospital Planning Division Council.

Surgical Microscope, also called Operation Microscope, is essentially meant for use while performing surgical operations of interior areas, which need illumination and observation under magnification. It essentially consists of a stereoscopic type of microscope with variable magnification and built-in illumination. The microscope is mounted on an adjustable arm for ease of manipulation.

This standard was first issued in 1975. Its first revision takes into account the technological developments, as well as the experience gained over the years during the course of implementation of this standard. In this revision, the requirements relating to materials, construction and performance have been modified and suitable methods of measurement of optical parameters have been specified.

While using the microscope, the stainless steel knobs provided for the magnichanger and focussing knobs, which are detachable, should be sterilised before the commencement of operation.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SURGICAL MICROSCOPE — SPECIFICATION

(*First Revision*)

1 SCOPE

1.1 This standard specifies the requirements for surgical microscope used for observation of interior areas while performing surgical operations under variable magnifications.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
210 : 1978	Grey iron castings (<i>third revision</i>)
617 : 1975	Aluminium and aluminium alloys ingots and castings for general engineering purposes (<i>second revision</i>)
1570 (Part 2/ Sec 1) : 1978	Schedules for wrought steels: Part 2 Carbon steels (unalloyed steels), Section 1 Wrought products (other than wire) with specified chemical composition and related properties (<i>first revision</i>)
1570 (Part 5) : 1985	Schedules for wrought steels: Part 5 Stainless and heat resisting steels (<i>second revision</i>)

3 NOMENCLATURE

3.0 The nomenclature of essential components of a surgical microscope is given in Fig. 1 and described as follows.

3.1 Base

Essentially a heavy casting mounted on wheels. It holds the upright over which the optical unit is mounted.

3.2 Castor Wheels

These are required to support the entire instrument and facilitate its free movement from place to place.

3.3 Upright

Upright is meant to carry the optical unit on the adjustable arm and to facilitate the movement of the later to a desired height.

3.4 Flexible Arm

A device for carrying the illuminated microscope at one end and holding on to the upright at the

other end with provision for clamping in any desired position. It also facilitates adjustment of the microscope at any desired height or angle for the convenience of the operator.

3.5 Magnichanger-Microscope

A binocular-stereoscopic type microscope with built-in illumination provided with the facility for changing the magnification without disturbing other alignments.

4 MATERIALS

4.1 The base shall be of cast iron conforming to any grade specified in IS 210 : 1978 or of cast Aluminium conforming to IS 617 : 1975.

4.2 The upright shall be made of stainless seamless tube [see IS 1570 (Part 5) : 1985 for guidance].

4.3 The articulated joints shall be of steel conforming to IS 1570 (Part 2/Sec 1) : 1978.

4.4 The aluminium casting — for flexible arms, moving mechanism, microscope, lamp house and any other component shall conform to IS 617 : 1975.

4.5 The materials of the various optical components shall be so chosen that they give ultimate performance requirements specified under 6.

4.6 The bulb and the transformer shall be so selected as to satisfy the performance requirements specified under 6.

4.7 Knobs provided for the magnichanger and microscope shall be made of aluminium/suitable plastics and shall be provided with sterilizable stainless steel caps.

5 CONSTRUCTION

5.1 The typical shape and the nomenclature used for various components of surgical microscope is shown in Fig. 1.

5.2 The base shall be constructed such that when the optical unit is extended fully with the articulated arms, the base shall stable and shall not topple.

5.3 The height of the upright shall be between 1.5 to 2 m. The design of upright shall be such that it conforms to the requirement given in 5.3.1.

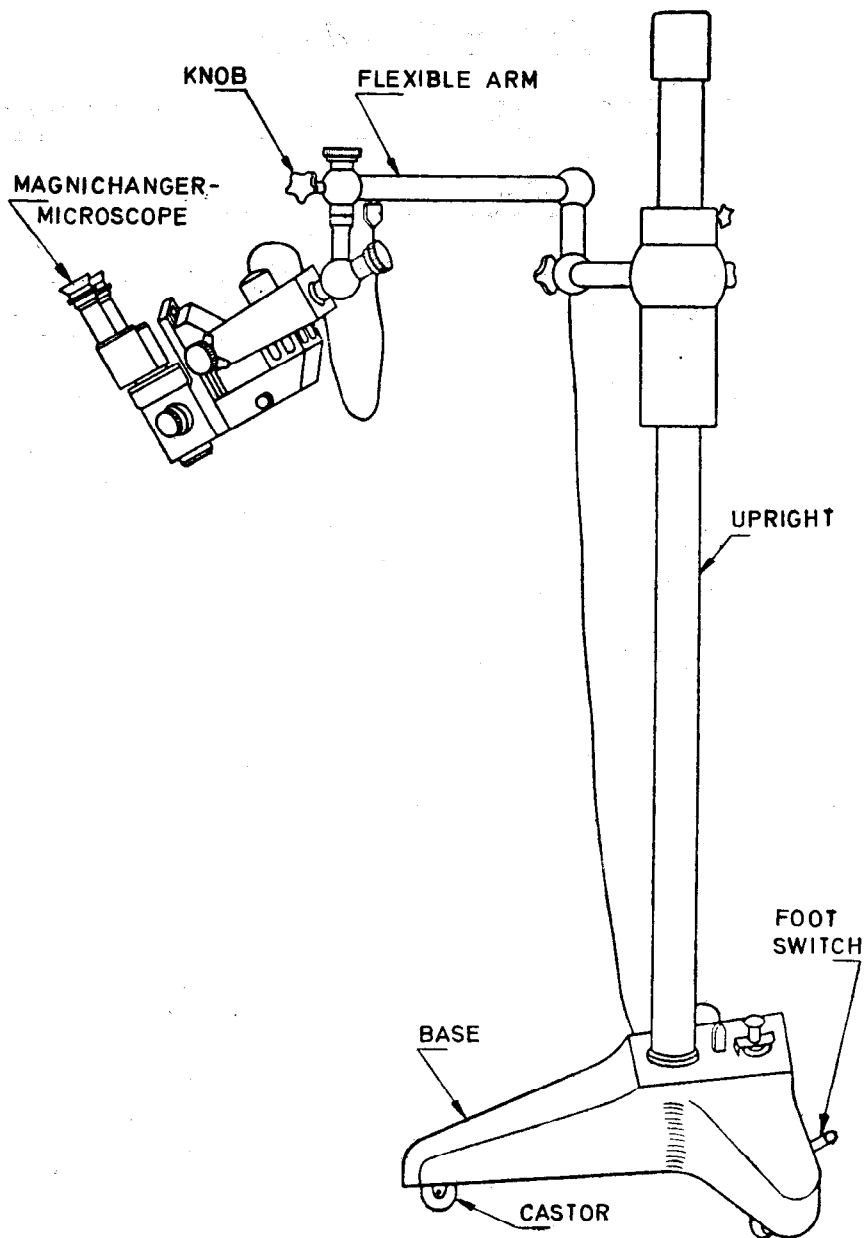


FIG. 1 SURGICAL MICROSCOPE

5.3.1 The flexible arm shall be moved over the permissible full length of the upright 50 times. At the end of the test, the movement of moving mechanism shall be free and there shall not be any deformation in the upright.

5.4 The moving mechanism shall be provided with counter weights within the upright so that the whole assembly is properly counterpoised when the knobs are not locked.

6 PERFORMANCE REQUIREMENTS

6.1 The intensity of the illumination at the object plane (that is at the focal length of 200 mm) when tested in accordance with **6.1.1** shall not be less than 20 000 lux.

6.1.1 Place the optical sensor of the photometer at a distance of 200 mm from the objective. The illumination from the microscope shall cover the optical sensor. Measure the intensity in lux with a photometer.

6.2 The field of illumination when tested as given in **6.2.1** at the object plane (that is at the focal length of 200 mm) shall be between 40 mm to 70 mm.

6.2.1 Keep a scale over the circular light patch generated by the microscope at a focal distance of 200 mm and measure the diameter of the spot.

6.3 The binocular shall have provision for two pairs of eye pieces, that is, with a magnification of $12.5\times$ and $20\times$ each and a provision for adjusting the interocular distance (distance between centre to centre of eye pieces) from 56 to 64 mm.

6.4 The magnification at a focal length of 200 mm when tested, as per the method given in 6.4.1, for the two eye pieces of $12.5\times$ and $20\times$ shall be as given in the following table:

Eye Pieces			
12.5 \times		20 \times	
Magnification $\pm 5\%$	Field of view $\pm 5\%$ (mm)	Magnification $\pm 5\%$	Field of view $\pm 5\%$ (mm)
4 \times	54	6 \times	30.75
6 \times	33.5	10 \times	19.5
9 \times	22	14 \times	12.5
13 \times	14	22 \times	8
23 \times	9	36 \times	5

6.4.1 Magnification and Field of View

The magnification for a particular position is determined by multiplying the instrument factor and eye piece magnification. To determine the instrument factor, a linear scale graduated in mm is held in the object plane and its sharp image is focussed into the eye piece. The scale length covered is L mm. The eye piece focal plane is the plane in which the aperture of the eye piece diaphragm lies. This is pre-determined (D mm). The ratio D/L is the instrument factor. The eye piece magnification (EPM) is $250/f$, f being the effective focal length of the eye piece.

- Magnification = $D/L \times \text{EPM}$
- The linear field of view for this position = L mm.

6.5 The eye piece of the microscope shall be provided with dioptric adjustments from $+5D$ to $-5D$.

6.6 Construction of the flexible arm and the joints shall be such that the optical axis of the binoculars can be positioned farthest from the upright to a minimum distance of 700 mm.

7 PAINTING

7.1 The microscope shall be painted preferably grey with a stoving enamel paint.

8 ACCESSORIES

8.1 The microscope shall be supplied with the following accessories:

- Sterilizable and detachable caps for knobs,
- One spare bulb, and
- Sterilizable cotton cloth cover for covering the microscope and the flexible arm.

9 MARKING

9.1 The microscope shall be marked legibly and indelibly with indication of the source of manufacture, serial number, year of manufacture, etc.

9.2 The objective shall be marked by engraving with the designed focal length, that is, 200 mm.

10 PACKING AND PACKAGING

10.1 The magnichanger — microscope and other detachable components shall be packed in a permanent box having suitable grooves with the same configuration as that of the microscope/components so as to hold them intact without any movement or play to avoid any damage during transit.

10.2 The base, upright and other accessories shall be packed in separate boxes during transportation, with suitable packings/cushioning inside so as to prevent any damage during transit.

11 INSTRUCTION BOOKLET

11.1 The microscope shall be provided with an instruction booklet giving description of the instrument and its functions and instructions for use and maintenance of the instrument.

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